

WHAT IS CLAIMED IS:

1. A steering actuator of an independent type steer-by-wire system comprising:
 - a housing fixed to a vehicle body;
 - an ultrasonic motor having a stator internally fixed to said housing and a rotator rotating relative
 - 5 to said stator when an electric current is applied;
 - a steering rod having a first end and a second end, the steering rod penetrating through a center portion of said ultrasonic motor, the first end of said steering rod extending out of said housing for connection to a tie rod; and
 - a movement conversion means operably associated with said steering rod for converting rotating
 - 10 movement of said ultrasonic motor into linear movement of said steering rod.
2. The actuator as set forth in claim 1, wherein said movement conversion means includes:
 - a ring gear having an inner peripheral surface, the ring gear being internally fixed to said housing;
 - at least one planetary gear installed to said rotator of said ultrasonic motor by means of pins, said
 - 15 at least one planetary gear being engaged with the inner peripheral surface of said ring gear;
 - a sun gear having an outer peripheral surface and an inner peripheral surface, the outer peripheral of the sun gear being engaged with said at least one planetary gear,
 - at least one worm gear formed with the inner peripheral surface of said sun gear, and
 - at least one rack formed at said steering rod, said at least one rack being engaged with said at
 - 20 least one worm gear.
3. The actuator as set forth in claim 1, wherein said movement conversion means includes:
 - a rotator ring gear integrally and internally formed at said rotator of said ultrasonic motor;
 - a plurality of pinions each having a rotating shaft, said plurality of pinions being rotatably engaged with said rotator ring gear, said rotating shafts being fixed to said housing;
 - 25 a plurality of worm gears integrally connected to said pinions; and
 - a plurality of racks formed at said steering rod so as to be engaged with said plurality of worm gears.

4. The actuator as set forth in claim 3, wherein the plurality of pinions include at least three pinions and the plurality of worm gears include at least three worm gears, wherein further said at least three pinions and said at least three worm gears are circumferentially equidistantly spaced inside said rotator.

5. The actuator as set forth in claim 4, wherein said at least three pinions and said at least three worm gears are equally installed by spacing angles of 120° along a circumferential direction inside said rotator, and said steering rod has a hexagonal sectional shape at a portion formed with said racks, whereby said racks are formed at three surfaces of the hexagonal sectional shape alternately arranged by spacing angles of 120°.

10 6. A steering actuator of an independent type steer-by-wire system for actuating a tie rod comprising:

a motor having a stator and a rotator and a piezoelectric ceramic, said rotator being configured for rotational movement relative to said stator in response to an electrical signal applied to said ceramic;

a gearing assembly having at least one worm gear rotatably associated with said rotator;

15 a steering rod having a first end, a second end and a portion having a rack therebetween, the first end operably associated with said tie rod, the rack threadedly mated with said worm gear; and wherein said rack and said worm gear are configured to convert rotational movement of said rotator into a linear motion of said steering rod in response to said electrical signal so as to actuate said tie rod.